IDENTIFICATION OF GEOSTRUCTURES OF CONTINENTAL CRUST PARTICULARLY AS THEY RELATE TO MINERAL RESOURCE EVALUATION

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Type I Progress Report
ERTS-A

a. Title: Identification of Geostructures of Continental Crust Particularly as They Relate to Mineral Resource Evaluation

ERTS-A Proposal No.: SR 180

b. GSFC ID No. of P.I.: IN 387

c. Statement and explanation of any problems that are impeding the progress of the investigation:

ERTS-1 data of much of Alaska have been made available to the investigators; however, many of the images, particularly in bands 4 and 5, are too dense and dark to identify or interpret surface features.

d. Discussion of the accomplishments during the reporting period and those planned for the next reporting period:

Preliminary examination and indexing of images completed; some images have been studied in more detail by participating specialists. In next reporting period ERTS-1 data will be made available to other specialists for detailed study of local areas, and PI and CoPI will start regional analysis.

e. Discussion of significant scientific results and their relationship to practical applications or operational problems including estimates of the cost benefits of any significant results (To be prepared in scientific abstract form of 200 words or less):

See attached statement. Category 4K.

f. A listing of published articles, and/or papers, pre-prints, in-house reports, abstracts of talks, that were released during the reporting period:

None.

g. Recommendation concerning practical changes in operations, additional investigative effort, correlation of effort and/or results as related to a maximum utilization of the ERTS system:

Recommend reduction of gamma factor in making ERTS negatives, to reduce time required for normal printing and to provide less dense positives so that they can be interpreted properly.

h. A listing of data of any changes in Standing Order Forms:

None, but change to negative and positive transparencies is contemplated to permit special printing of less dense prints of critical images, and to enhance interpretation ability in all images.

i. ERTS Image Descriptor forms:

None.

j. Listing of date of any changed Data Request forms submitted to Goddard Space Flight Center/NDPF during the reporting period:

None.

k. Status of Data Collection Platforms (if applicable):

Not applicable.

structural complexity of the western Brooks Range.

In south-central Alaska, Donald H. Richter notes that on image 1044-20215 the newly described Totshunda fault is readily identified and extends into areas not yet mapped, providing a guide to future mapping of the fault. He postulates that this fault is a younger splay of the Denali fault; a splay along which much of the geologically recent movement of the Denali system has occurred. In addition, the image clearly shows another fault parallel to the south of the Totshunda which has been suspected but as yet not recognized in the field.

References

Lathram, E. H., 1972, Nimbus IV view of the major structural features of Alaska: Science, v. 175, p. 1423-1427.

Gedney, L., Shapiro, L., VanWormer, D., and Weber, F., 1972, Correlation of epicenters with mapped faults, east-central Alaska, 1968-1971: U.S. Geol. Survey open-file report.

New Data on Geologic Structures in Alaska

by

Ernest H. Lathram, W. W. Patton, Jr., Irvin L. Tailleur and

Donald H. Richter

Preliminary examination of ERTS-1 imagery of Alaska by geologists associated with the Geostructures of Alaska Investigation has yielded new structural data.

E. H. Lathram notes that ERTS imagery in central and northern Alaska substantiates the existence of a conjugate set of northeast and northwest faults suggested by linears noted on Nimbus IV images (Lathram, 1972). Linears of both trends are well expressed on ERTS image 1030-20442, and several have been mapped as faults, including the Shaw Creek fault. A study of microseismic activity in central Alaska (Gedney et al, 1972) shows concentrations of epicenters at the intersection of the linear along the Tanana River seen on Nimbus IV images and northeast-trending faults, strengthening the probability that this linear is an extensive fault zone. The geometric fidelity of the 1:1,000,000 scale ERTS images in northern Alaska permits direct comparison with the Geologic Map of Northern Alaska now in preparation, aiding in correct positioning and interpretation of the distribution and structure of regional map units.

W. W. Patton, Jr., on the basis of previous field mapping, interprets the Kobuk Trench to be the northern margin of a broad west-trending fault zone bounded on the north and south by strike-slip faults. He reports that preliminary examination of image 1072-21180 provides new data in support of that interpretation. Within the fault zone in the area, the west-trending Alatna Hills are composed of apparently structurally homogeneous Cretaceous sedimentary rocks. On the ERTS image, however, these rocks are seen to be cut by numerous, closely spaced northeast-trending linears that terminate at the north and south margins of the fault zone. These appear to be complementary fractures that would be expected to develop as a result of the differential movement between strike-slip faults.

In northwestern Alaska, I. L. Tailleur notes that on the band 5 MSS image, Mississippian limestone appears white, while shale, sandstone, and chert of other ages appear dark. As the limestone is the basal formation of the numerous thrust plates stacked in the area, images of band 5 will assist significantly in depicting the distribution of the thrust plates. In addition, large mafic and ultramafic intrusive masses in the DeLong Mountains are darker gray and have a more homogeneous texture than adjoining rocks when viewed on the image of band 7. These observations suggest that color-additive techniques applied to the images of this area (nos. 1009-22090, 1046-22143, and 1046-22145) will aid significantly in the recognition of the limestone, of ultramafic and mafic rocks, and possibly of other formational units as well. A mosaic of these images provides a synoptic picture that shows strikingly the